

Effects of environmental change on water availability and flood risk

philip b duffy

Public Comments

No public comments were received for this proposal.

Technical Synthesis Panel Review

Proposal Title

#0196: Effects of environmental change on water availability and flood risk

Final Panel Rating
inadequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

Dr. Duffy and his team of talented collaborators propose to examine effects of climate change on (1) flood risk; (2) dry-year water supply; (3) water demand; (4) El Nino; and (5) drought. The proposal is a poorly focused collection of random research fragments that have no clear relevance to CALFED. Moreover, the proposed research has a poor treatment of model uncertainty. Also, the ensemble framework may be overkill for the social questions examined -- assessments of water system reliability do not require climate predictions per se, they just require knowledge of the circumstances in which the water system is vulnerable. Pertinent reviewer comments include: (1) This is one of the better proposals that I have reviewed, both in the ambitious set of objectives and the care taken to assemble the right team to satisfy those objectives. While it might be a bit difficult to glean out meaningful management and mitigation policies from the large volumes of data that will be produced, again, the authors have assembled the right team -- with a mix of State and Fed water resources management personnel -- to accomplish this objective. (2) The project combines and links models from different disciplines to investigate most important issue of water availability with flood risk considering climate change, demographic change, and land use. The project will use some state of the art models to capture the dynamics of the systems. Due to the involvement of

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many institutions and people, the progress of the proposal may be hampered. (3) the approach is feasible but perhaps overly ambitious. It seems that canned scenarios rather than fully coupled super models may be a more cost effective way to get an idea of the sensitivity of the system

Additional Comments:

The applicants should consider themselves fortunate that the mail reviewers and the panel actually read the proposal. The description of the proposed research tasks does not start until page 17 -- this is simply bad manners. Careful editing is seriously needed. Critique of the characterization of uncertainty: (a) in flood risk, the applicants state that CALFED funding will be used to extend one or more GCM simulations of historical climate to 2100. How can a single simulation be used to convey meaningful statements of risk? (b) For dry year water supply, the applicants assume that the spread from multiple models [climate and hydrology] can be used as a proxy for uncertainty -- this assumption is clearly flawed as models share assumptions and source code. Can the applicants begin to assess model uncertainty explicitly? (c) The applicants hail Dettingers component-based resampling approach as a method that will increase the number of ensemble members and produce a better characterization of uncertainty -- wrong -- the method will only smooth the GCM p.d.f.s and cannot account for additional sources of uncertainty; (d) the Wood et al. downscaling method is seriously flawed because it does not account for the uncertainties in downscaling.

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Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

This lengthy and ambitious proposal was presented by a well-qualified team of applicants. The external reviewers' opinions of this proposal were divergent. However, the panel regarded the more positive reviews as being overly enamored with the project team and the promised results. The panel felt the proposal was a poorly focused and poorly coordinated collection of research goals. A major technical flaw in the proposal is that the applicants present no means for rigorously analyzing model uncertainty. For example, the applicants propose a single GCM simulation scenario to assess flood risk - no estimation of uncertainty can be obtained from such an approach. The panel felt that the proposal identified a critical need for integrative, interdisciplinary, system-wide modeling that produces data of value to decision-makers and managers. However, the panel felt that this proposal was unlikely to address CBDA's priorities with products that will be relevant to CBDA management decisions.

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Also, modeling projects of this scope MUST involve a rigorous analysis of uncertainty to be practically valuable. A more refined and focused project, that could act as a forum for a wider spectrum of researchers and stakeholders, should be considered by CBDA, preferably through a different funding mechanism than a general Science PSP.

Rating: Inadequate

Technical Review #1

proposal title: Effects of environmental change on water availability and flood risk

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	Yes, the goals, objectives and hypotheses are clearly stated. The proposed work is important as (a) the project will incorporate many ideas, concepts and skills (multi-disciplinary work); (b) the project will investigate the effect of climate change, demographic change and land use on hydrological system especially flood risk and water availability.
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	The study is justified as this an advancement of the existing knowledge. The proposal clearly outlines the concept and methodology and explains the underlying basis. The selection of research is justified.
Rating	very good

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be

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Technical Review #1

useful to decision makers?

Comments	While the approach is well designed carefully and linked with many different organization, people, and skills, the progress of the project might be hampered if something goes wrong in the intermediate process. The information might be used for decision making process.
Rating	good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success?
Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The approach is well documented but very lengthy. The approach is technically feasible. The project might be a successful, as the team has strong multidisciplinary research background.
Rating	good

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	The approach does not outline any pre and post monitoring design, however, this model shall be calibrated with the observed data to verify model performances.
Rating	very good

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

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Technical Review #1

Comments	The results from the project may be used in decision-making process, and has scientific values. The project outcome may likely contribute to the larger data management system.
Rating	excellent

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The project team has excellent track record and may capable of performing this project. The well-reputed institutions have research infrastructure to accomplish this project.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The proposed budget is adequate. However, the budget should be revised to reduce the cost.
Rating	good

Overall

Provide a brief explanation of your summary rating.

Comments	The project combines and links models from different discipline to investigate most important issue of water availability with flood risk considering climate
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Technical Review #1

	change, demographic change and land use. The project will use some state of art models to capture the dynamics of the systems. Due to involvement of many institutions and people, the progress of the project might be hampered.
Rating	very good

Technical Review #2

proposal title: Effects of environmental change on water availability and flood risk

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	Goals and objectives are clearly stated for the most part. The proposal is timely in the sense that updated climate change forecasts are becoming available at this time.
Rating	good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	Climate prediction ensembles for California already exist, although these need to be updated. The conceptual model is acceptable, although more detail on the specific model components (i.e. surface hydrology) would have provided a better sense of how the models are coupled.
Rating	fair

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be

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Technical Review #2

useful to decision makers?

Comments	The approach is feasible but perhaps overly ambitious. It seems that canned scenarios rather than fully coupled super-models might be a more cost effective way to get an idea of the sensitivity of the system to IPCC scenarios to start with. Results are likely to provide some new knowledge on future water resources concerns in California. Water quantity predictions may be better than water quality predictions due to the emphasis that the authors' place on their approach.
Rating	good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success?
Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The project is technically feasible, and likely to provide incremental new information. The approach is more or less a brute force (monte carlo) approach to addressing the issue. Because it uses existing models and does not involve field work or new measurements it is unlikely to unravel any mysteries. Success is expected but even so this will not yield a major new breakthrough in understanding.
Rating	fair

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	This a modelling study. No new monitoring is planned.
Rating	not applicable

Technical Review #2

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	Hydrologic/water-management modelling predictions based on the new climate prediction ensembles will likely be published in the peer reviewed literature. These products are likely to be of value, and predictions will be testable in the near future. The study plan includes construction of a larger, interactive data management framework and with new infrastructure.
Rating	good

Additional Comments

Comments	It is suggested that the researchers should clearly indicate in the outcomes where environmental policy of the State of California and the nation plays a role in influencing the water resources situation in the region.
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The project members have an outstanding reputation and track record. The team is capable of delivering on the project. They apparently do not have all required infrastructure - major equipment purchase is included in the budget.
Rating	very good

Technical Review #2

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	It seems that much of the infrastructure (super-computers etc.) should already be in place to conduct this work. In this sense the project budget, especially for salary, equipment and overhead seems somewhat inflated. If leveraging of existing funding is truly included I think that this project could be completed with 33% of the proposed budget.
Rating	fair

Overall

Provide a brief explanation of your summary rating.

Comments	This is a thorough (however very wordy) proposal on climate change impacts on water supply and infracture in California. The proposal is judged to be technically sound (even outstanding in places) but the budgetary requirements seem overstated. Given sufficient resources are available, I would recommend funding at reduced level.
Rating	good

Technical Review #3

proposal title: Effects of environmental change on water availability and flood risk

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	The goals, objectives, and hypothesis are very clear and consistent. The relative importance of California to the US economy necessitates a thorough and institutionally unbiased appraisal of climate change-induced impacts on water resources. The questions asked in this proposal are among the most important with respect to climate change and water resources.
Rating	excellent

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	The study is justified, the model is clearly stated, and the research area is defensible. All of the relevant questions and reservations are clearly addressed in the proposal
Rating	excellent

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to

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Technical Review #3

generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	<p>The approach is clear and well designed and appropriate for meeting the project objectives. Of concern may be the monthly timestep of the water resources model. Since flooding occurs over days, it is unlikely that the CALSIMII model will be able to detect flood events. To adequately address this question, CALSIMII should be implemented on a daily (or at the very least, weekly) timestep over the study period.</p> <p>The project, if successful, will open the door to the inclusion of large scale climate model ensembles in the planning process.</p>
Rating	very good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success?
Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	<p>The approach is well documented and technically feasible. The challenge will be in data management, both of the RCM output and the CALSIMII water management model output. However, among the authors are experts in managing huge datasets and mining those data for information. Even so, it may be difficult to identify CALSIMII output sequences of importance without clearly identifying metrics of importance.</p> <p>The assembled authors are fully capable of satisfying the objectives of this project.</p>
Rating	very good

Technical Review #3

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	Not applicable
Rating	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	<p>The products produced will be very valuable to California decision makers.</p> <p>Managing and dessiminating the data in this project will be a significant and cutting-edge contribution.</p> <p>Since the State of California contains several different climate types across its geographical domain, applications to other domestic and foreign regions are very likely.</p>
Rating	excellent

Additional Comments

Comments	None
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	I have no concern at all with the team of authors and the infrastructure that is available to them.
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Technical Review #3

Rating	excellent
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Budget

Is the budget reasonable and adequate for the work proposed?

Comments	It is reasonable for the work proposed AND for the team assembled.
Rating	excellent

Overall

Provide a brief explanation of your summary rating.

Comments	This is one of the better proposals that I have reviewed, both in the ambitious set of objectives and in the care taken to assemble the right team to satisfy those objectives. While it might be a bit difficult to glean out meaningful management and mitigation policies from the volumes of data that will be produced, again, the authors have assembled the right team - with a mix of State and Fed water resources management personnel - to accomplish this objective. Once completed, this project will be a very valuable piece of research to the national and international climate and water resources communities.
Rating	excellent